

Appendix D: Compatibility Determinations

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COMPATIBILITY DETERMINATION

Use: Hunting

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Allow public hunting for big-game (white-tailed deer and wild turkey), upland game (gray and fox squirrel), and waterfowl. Hunting is a priority public use of the National Wildlife Refuge System. Season dates, bag limits, and harvest methods are consistent with Missouri regulations, except when more restrictive Refuge regulations apply. All of these hunts occur within the 8,960-acre bottomland forest east of Ditch 4, except for waterfowl hunting which is limited to Pool 8 consisting of approximately 1,191 acres. A Refuge Hunting Regulations brochure is available to inform the public of hunting opportunities and Refuge regulations.

The Refuge also provides a managed deer hunt occurring in the area west of Ditch 4 and north of Ditch 11, which includes the Wilderness Area. The managed hunt utilizes muzzleloaders only. The number of hunters allowed fluctuates with deer population estimates. Generally, the hunt consists of approximately 130 hunters selected by a random drawing conducted by the Missouri Department of Conservation (MDC) earlier in the year. Up to 5

disabled hunters are also accommodated in a 150-acre unit separate from the primary hunt area of 6,891 acres.

A MDC Spring Turkey Women’s Outdoor Skills Event will occur within the Public Hunting Area. Refuge staff and volunteers will assist MDC personnel in conducting this turkey hunting workshop that culminates with participants attempting to bag a turkey using a shotgun. This event will be held during the spring turkey hunting season.

The CCP calls for the Refuge to co-sponsor a Fall Youth Firearms Deer Hunt within a portion of the Public Hunting Area. This hunt would occur during October.

The Refuge permits archery deer hunting only, which is concurrent with the State season and regulations, except that archery hunters must wear State prescribed hunter orange during the overlap with the squirrel season. Squirrel hunting occurs within the State framework; however, the Refuge season closes September 30 of each year, hunters must wear State prescribed hunter orange during the archery deer season overlap, and only non-toxic shot may be used in shotguns. Shotgun spring turkey season is open during the State season including youth hunting dates and only non-toxic shot may be used. The Refuge is closed to fall firearm turkey season. Bow hunters may harvest a turkey using archery equipment during the fall season.

Waterfowl hunting in Pool 8 is available dependent on Refuge water level management objectives within the framework of the State season. Hunters are regulated through a daily drawing conducted by MDC personnel assisted by Refuge staff at Duck Creek Conservation Area.

Availability of Resources: Refuge staff assists MDC personnel at Duck Creek Conservation Area to administer the daily drawing that includes the Pool 8 Area on the Refuge. Law enforcement is provided primarily by Refuge personnel. Parking lots and roadways accessing Pool 8 are maintained by MDC and metal foot bridges over Ditch 1 are shared maintenance by MDC and the Refuge.

Administering the muzzleloader hunt exceeds the capacity of Refuge staff alone. It is made possible through support of volunteers and a partnership with MDC. This event usually results in some staff working 14-hour days and others working 8 hour shifts on Saturday and Sunday. Additional law enforcement assistance is sometimes detailed to the

2005 Visitation and Harvest Figures for Annual Hunts

Hunt Type	Visits	Hours Spent	Harvest
Deer/Turkey Archery	3,700	15,362	96 deer, 4 turkeys, 1 pig
Deer Muzzleloader	210	Not available	31 deer
Waterfowl	163	Not available	173 ducks, 2 geese
Spring Turkey	182	649	12 turkeys
Squirrel	129	314	199 gray, 14 fox

Refuge to conduct this activity. The disabled hunt blinds require yearly maintenance and repairs, plus providing gravel on access lanes to the blinds. Special signage must be placed in the area prior to the hunt and taken down after the hunt.

Administering the Fall Youth Firearms Deer Hunt within a portion of the Public Hunting Area called for in the CCP would also exceed the capacity of existing Refuge staff and will require assistance from volunteers and MDC.

Hunters use the existing network of roads to access areas open to hunting. Parking lots, boat ramps, restrooms, leaflets, information and sign-in/sign-out kiosks, and signs are provided by the Refuge for use by hunters. The Refuge also provides staff and volunteers to maintain these facilities and disseminate information to hunters.

Adequate resources are available to manage the existing hunting program at the current level of participation. However, funding printing of the Refuge Hunting Regulations brochure is lacking some years, calling for redirection of existing Refuge funding. This redirection is often at the expense of other Refuge programs such as maintenance and other public use programs. Proposals in the Refuge Comprehensive Conservation Plan (CCP) should help address these funding concerns.

Anticipated Impacts of the Use: Accommodating this wildlife-dependant use is expected to result in minimal impacts. Although hunting causes mortality to wildlife, season dates and bag limits are set with the long-term health of populations in mind. Populations for certain species, for example white-tailed deer are monitored by Refuge staff. Survey information indicates that limited harvest will not adversely affect the overall deer population level. Without harvest, deer will quickly overpopulate an area causing degradation to the quality and quantity of vegetation. Deer hunting may also reduce the number of deer/car collisions on adjacent roadways. Temporary disturbance to other wildlife may occur during hunting activity.

Waterfowl hunting is allowed in Pool 8 only. This limits conflicts between waterfowl and deer hunters, plus limits disturbance to migratory birds. Waterfowl hunters may disturb migratory birds and other wildlife as they travel to and from their hunting sites or when retrieving downed birds. Depending on the location and the number of migratory birds in the area, disturbance can be temporary with displaced birds moving to other locations within the hunting area or to nearby closed areas.

Conflicts between hunters competing for prime waterfowl hunting spots can occur in areas where birds concentrate; however limiting the number of hunters using the area depending on water levels and available acreage reduces this concern.

Under current regulations conflicts with other user groups have been few, because of the designation of the Public Hunting Area for hunting uses only and the rest of the Refuge open to other user groups, except for Closed Areas. During the two day managed muzzleloader deer hunt in January, the 6,891-acre hunt area is closed to other user groups to avoid conflicts and safety concerns.

Possession of firearms is prohibited in all areas outside the Public Hunt Area at all times, except for the managed muzzleloader deer hunt, and only allowed in the Public Hunt Area during the spring turkey season or special Refuge sponsored hunting events. This regulation reduces the potential for conflicts between the various Refuge user groups.

Public Review and Comment: This compatibility determination was part of the Draft

Comprehensive Conservation Plan and environmental assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

____ Use is Not Compatible

X Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility:

1. This use must be conducted in accordance with State and Federal regulations, and special Refuge regulations published in the Refuge Hunting Regulations and Public Use Regulations brochures.
2. A system of closed areas must be maintained to ensure that migratory birds have adequate resting and feeding areas while hunting seasons are occurring.
3. Hunting is subject to modification if on-site monitoring by Refuge personnel or other authorized personnel results in unanticipated negative impacts visitor safety, natural communities, wildlife species, or their habitats.
4. Harvest occurs only in populations that can support the removal of individuals.
5. Hunting may be more restrictive than State seasons and regulations to ensure compliance with visitor safety and reduce wildlife disturbance.
6. Waterfowl hunting is restricted to ½ hour before sunrise until 1:00 p.m. to allow the birds to feed and rest undisturbed.
7. The yearly flooding of the Pool 8 waterfowl hunting area will depend on both climatic conditions and management strategies occurring that year. The number of waterfowl hunters allowed in Pool 8 will be limited according the water levels and available flooded habitat to regulate the distribution and disturbance of the hunters and still provide resting areas for the birds.
8. The managed muzzleloader deer hunt area and portions of Bluff Road will be closed to other Refuge visitors during this hunt to avoid possible user group conflicts and ensure public safety.
9. No motorized ATV's or other vehicles are allowed to be used to aide in hunting

10. From October 1 to March 1 the area between Ditch 4 and Ditch 6 south of Monopoly Marsh will be closed to hunting as well as other public uses to provide an area free from wildlife disturbance.

Justification: In view of the above and with the stipulations previously described, hunting will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Hunting seasons and bag limits are established by the Missouri Department of Conservation and generally adopted by the Refuge. These restrictions ensure the continued well-being of overall populations of game animals. Hunting does result in the taking of many individuals within the overall population, but restrictions are designed to safeguard and maintain adequate breeding populations from year to year. Specific Refuge regulations address equity and quality of opportunity for hunters, and help safeguard Refuge habitat. Disturbance to other fish and wildlife does occur, but this disturbance is generally short-term and adequate habitat occurs in adjacent areas.

The removal of a portion of the deer herd will help control the population at a level to ensure habitat protection from over-browsing and maintain the health of the herd. The deer herd is studied regularly through survey methods and post-mortem examination of harvested deer. To not continue with current harvest rates may cause appreciable damage to Refuge habitat. The existing deer population can support the removal of deer by the muzzleloader hunt and still maintain the herd stability and provide a recreational opportunity. Restricting afternoon waterfowl hunting on Pool 8 provides adequate time for feeding, resting, and social behavior activities.

Conflicts between hunters are localized and are addressed through law enforcement and continuous review and updating to State and Refuge hunting regulations. Conflicts between other various user groups are minor given the season of the year for hunting, the location of most hunting away from public use facilities, and the system of administrative closed areas. Currently hunters, bird watchers, wildlife observers, hikers, anglers, and photographers can equally enjoy recreational activities in a safe manner.

The stipulations listed above will ensure proper control of the means of use and provide management flexibility should detrimental impacts develop.

Allowing this use also furthers the mission of the National Wildlife Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resource on the Refuge.

Signature: Refuge Manager:_____

(Signature and Date)

Concurrence:Regional Chief:_____

(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Fishing

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-orientated recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Fishing is a priority public use that accounts for about 2,300 visits to the Refuge each year. It is available throughout the year in various locations on the Refuge. Open water on the Refuge includes 9.2 miles of stream habitat, 240 acres of other type of open water including Red Mill Pond, May Pond, Fox Pond, Job Corps Lake, Stanley Creek, Mingo River, Lick Creek, Gum Stump, Binford Ponds, Hartz Pond, and Cow Creek. In addition, Refuge ditches total 34 miles of deep water habitat and Monopoly Marsh and Rockhouse Marsh are available periodically throughout the year totaling 3,905 acres. May Pond and Fox Pond are stocked with catfish every 2-3 years. At least 46 different fish species occur on the Refuge. Channel catfish, white crappie, large mouthed bass, spotted bass, and miscellaneous sunfish species are popular fish sought by sportsmen. In addition, many visitors fish the ditches for rough fish such as carp, bowfin, spotted gar, and shortnose gar. Chain pickerel are highly sought after in Mingo River and Stanley Creek. Popular bank fishing sites include Flat Banks, Burris Bridge, May Pond, along Stanley Creek, Ditch 11, and at the downstream end of water control structures such as Ditch 3, 5, Ditch 4,

and Spillway. In 2004, fishing accounted for 2,324 visits to the Refuge. Approximately 40% of anglers utilize boats while conducting this activity. Every year, the Refuge hosts Kid's Free Fishing Day which attracts over 300 children every year. This popular event introduces and reinforces children's interest in fishing.

Fishing regulations at Mingo follow the State fishing regulations for impounded waters and includes the traditional taking of fish with rod and reel from shore or boat, trotlines, limb lines, bank lines, and jugs from sunrise until sunset. Non-game fish may be taken for personal use by nets and seines. Trammel and gill nets must be attended at all times and plainly labeled. No commercial fishing is allowed. Common snapping turtles and soft-shell turtle may be taken by pole and line only. Bow fishing is prohibited on the Refuge. Recreational fishing is allowed throughout the year, but access to certain areas is subject to seasonal restrictions.

Availability of Resources: Anglers use the existing network of roads to access the various areas of the Refuge for fishing. The Refuge provides numerous parking lots, boat ramps, signs and other facilities to assist anglers. The Refuge provides staff to maintain facilities, disseminate information to visitors, and enforce regulations. Adequate resources are available to manage the existing fishing program at the current level of participation.

Anticipated Impacts of the Use: Accommodating this wildlife-dependant use is expected to result in minimal impacts. Although fishing causes mortality to fish, season dates and limits are set with the long-term health of populations in mind. Populations of most species are regularly monitored by Missouri Department of Conservation. Disturbance to wildlife may result from fishing activity. This disturbance is expected to be limited in scope and duration. Because fishing is not permitted in popular waterfowl feeding and loafing areas during the waterfowl migration, this use will not be a source of disturbance to waterbirds concentrated in these areas. All motor vehicle use associated with fishing is restricted to designated roads and parking areas which reduces disturbance to wildlife. Disturbance to habitat is minimal although some soil compaction and erosion can occur along bank fishing areas. These impacts are generally localized and have little overall negative impact. Shoreline erosion and turbidity are common effects caused by boat wakes. Boating is restricted to electric trolling motors which erosion and turbidity effects are minimal to

non-existing. No motors are authorized in the 7,730-acre Wilderness Area which includes Stanley Creek, portion of the Mingo River, Monopoly Marsh, Ditch 4, Ditch 5, Ditch 6, and Ditch 10.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

_____ Use is Not Compatible

 X Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: To ensure compatibility with Refuge purposes and the mission of the National Wildlife Refuge System, recreational fishing can occur on the Refuge if the following stipulations are met:

1. This use must be conducted in accordance with State and Federal regulations, and applicable special Refuge regulations published in the Public Use Regulations brochure.
2. Portions of the Refuge are restricted during the waterfowl migration period to limit disturbance to large numbers of resting and feeding waterfowl.
3. Fishing is available year-round on Ditch 1, Ditch 2, Ditch 6, Ditch 11, Mingo River, Job Corps Lake, Stanley Creek, May Pond, Fox Pond, and Red Mill Pond.
4. At May Pond and Fox Pond, only pole or rod-and-reel is authorized.
5. At May Pond, the minimum bass length is 12 inches.
6. At Fox Pond, there is no bass length limit.
7. Fishing is available from March 1 to September 30 on the Ditches 3, 4, 5, Monopoly Marsh, Rockhouse Marsh, and Gum Stump.

Justification: In view of the above and with the stipulations previously described, fishing will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Fishing seasons and limits are established by Missouri Department of Conservation and adopted by

the Refuge. These restrictions ensure the continued well-being of overall populations of fish. Fishing does result in the taking of many individuals within the overall population, but restrictions are designed to safeguard adequate population and recruitment from year to year. On-going habitat restoration and enhancement projects are also improving overall fish habitat and increasing the carrying capacity of the Refuge for fish. Specific Refuge regulations address equity and quality of opportunity for anglers, and help safeguard Refuge habitat. Disturbance to other fish and wildlife does occur, but this disturbance is generally local, short-term and does not adversely impact overall populations. Loss of plants or increases in water turbidity from boat motors is extremely minor to non-existing. Harvest of common snapping turtles and soft-shelled turtles is restricted to pole and line and personal use. Alligator snapping turtles are rare but known to exist at Mingo and must be released immediately if encountered. Mussels are protected and can not be harvested. Allowing this use supports the mission of the National Wildlife Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the Refuge.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Wildlife Observation and Wildlife Photography

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

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Description of Use: These uses are priority public uses of the Refuge System. Currently, wildlife observation and photography account for nearly 82,000 visits annually to the Refuge. Typical use is by individuals, family groups, and large groups. Wildlife observation and photography are becoming increasingly popular activities for visitors, and a source of economic growth for many local communities. The Refuge provides outstanding wildlife viewing opportunities due to the abundance of eagles, ducks, warblers, herons and other birds, deer, scenic vistas, and a Congressionally designated Wilderness Area, people find enjoyable and interesting. The public and communities desire more opportunities for these uses.

In 2004, nearly 7,500 visits occurred to the Wilderness Area, primarily for photography and wildlife observation opportunities. Red Mill Drive, Bluff Road to the Spillway, and Sand Blow Ridge Road, encompassing 14 miles, are available throughout the year for driving access and wildlife observation and photography. The Boardwalk Nature Trail is an interpretive 1.0-mile trail that leads to a disabled accessible platform overlooking the Rockhouse

Marsh. This is a popular birding, photography, and wildlife observation destination. In 2004, over 16,000 visits to the Boardwalk Nature Trail occurred. In addition, Hartz Pond, Bluff, Sweet’s Cabin, and Stanley Creek Trails are available for wildlife observation and photography. These trails accounted for over 4,500 visits in 2004. Several foot bridges are available across several ditches to promote access for wildlife observation and photography. The Refuge provides facilities to support wildlife observation and photography including observation platforms and vistas, benches, hiking trails, a canoe trail, overlook pavilion, parking areas, and an Auto Tour Route. These facilities offer outstanding wildlife viewing opportunities due to the abundance of wildlife and scenic splendor.

Availability of Resources: Infrastructure exists on the Refuge to support such activities. Overlooks are placed in areas that provide consistent wildlife viewing opportunity with minimum disturbance to wildlife. The construction and maintenance of Refuge roadways, kiosks, benches, overlook platforms, pavilion, scenic vistas, traffic counters, the Boardwalk Nature Trail and other trails are the principle expense associated with this activity along with law enforcement activities to ensure proper compliance with Refuge regulations while conducting these activities.

Currently, there are one full-time and permanent part time visitor services staff members for the entire Refuge. The needed staff for coordinating wildlife observation and photography programs is available, but limits facilitated programs. Maintaining the public use facilities is part of routine management duties and staff and funding is available. Additional facilities and visitors services specialists, as proposed in the Comprehensive Conservation Management Plan, will enhance public opportunities for these uses and improve the quality and quantity of opportunities.

To help track, regulate, and analyze effects and impacts of the use, Special Use Permits are issued for groups exceeding 10 individuals and/or when programs are conducted independently of Refuge staff. Administering Special Use Permits for groups exceeding 10 individuals increases overall costs of Refuge operations, including but not limited to: development and review of policy and procedure, yearly administration of permits (inquiries, screening applicants, issuing permits), and enforcement of permit conditions. In the short-term, existing staff is adequate. However, the number of permits issued

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Miles Open	28	28	34	34	35	35	35	35	35	28	28	28
Acres Affected	1,700	1,700	2,060	2,060	2,120	2,120	2,120	2,120	2,120	1,700	1,700	1,700
Percent of Refuge Affected	7.9	7.9	9.5	9.5	9.8	9.8	9.8	9.8	9.8	7.9	7.9	7.9

will have to be limited in balance with staff resources. In the long-term, additional administrative and/or other personnel as identified in the Comprehensive Conservation Plan will be needed.

Anticipated Impacts of the Use:

Disturbance of wildlife is the primary concern regarding these uses. There is little disturbance to migrating waterfowl because these activities are prohibited in areas where waterfowl concentrate during annual migrations. Wildlife disturbance at other times and throughout the Refuge is more difficult to assess. Studies by Blumstein¹ and Blumstein et al.² show that 'flight-initiation-distance' varies by species and intruder starting distance as well as by things such as flock size, angle of approach, time of year, time of day, reproductive state, distance to refuge, and type of disturbance. Given these complexities, it is not possible to determine the level of disturbance generated by each activity. It is likely there is a zone of influence on either side of existing travel ways where some level of wildlife disturbance occurs from all sources.

There are no specific studies regarding wildlife disturbance at Mingo, but in a study conducted in and around Boulder, Colorado, Miller et al.³ found that composition and abundance of birds were altered adjacent to trails in both grassland and forest ecosystems. The authors noted the cause could be the physical presence of the trail, associated human disturbance, or both factors acting in concert. These effects, for most bird species, were largely confined to a zone of influence extending approximately 250 feet on either side of trails and may be less pronounced in areas with less human development and recreational use than the study area.

1. Blumstein, D.T. 2003. Flight initiation distance in birds is dependent on intruder starting distance. *J. Wildl. Manage.* 67:852-857.

2. Blumstein, D.T., L.L. Anthony, R.G. Harcourt, and G. Ross. 2003. Testing a key assumption of wildlife buffer zones: is flight initiation distance a species-specific trait? *Biological Conservation* 110:97-100.

3. Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. *8(1):162-169*

We applied this concept as one measure of potential wildlife disturbance along travel ways open to wildlife observation and wildlife photography at Mingo. The table below shows amount of travel ways open to these activities as well as the associated zone of influence (250 feet on either side of travel ways) in both acres and percentage of the Refuge. These travel ways are also open to interpretation, special events, horseback riding, hiking, recreational biking, and jogging. In any month, less than 10 percent of the Refuge is affected by these activities.

The Boardwalk Nature Trail (1 mile), Hartz Pond Trail (.2 miles), and a trail leading to Sweet's Cabin (1.5 miles) and around Stanley Creek are also open to wildlife observation and wildlife photography. The zone of influence totals approximately 164 acres (.76 percent of the Refuge) for these additional trails.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

_____ Use is Not Compatible

 X Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The following stipulations are required to ensure compatibility:

1. Along 13 miles of the Auto Tour Route, vehicular access from March 1 through November 30 will occur except for closure during the State firearm deer season and as needed for reptile and amphibian migrations.
2. A 6-mile portion of the Auto Tour Route and the entire 5-mile length of Red Mill Drive will be open year-round to vehicular traffic.

3. The entire 3-mile length of Sand Blow Ridge Road will be open year-round to vehicular traffic.
4. Vehicular traffic will occur from May 15 through September 30 on the 1-mile road segment between May Pond and Fox Pond.
5. Portable observation/photography blinds may be erected in open portion of the Refuge, but must be removed daily.
6. A portion of the Refuge west of Ditch 6 is available for use year-round.
7. A portion of the Refuge east of Ditch 6 to the eastern boundary of the Refuge will be available from March 1st until September 30th.
8. From October 1 to March 1, the area between Ditch 4 and Ditch 6 south of Monopoly Marsh will be closed to all public use to provide an area free from wildlife disturbance.
9. Groups greater than 10 individuals are required to possess a Special Use Permit.
10. Permanent photo/observation blinds will be administered through a reservation system.

Justification: Wildlife observation and photography are compatible wildlife dependent activities. They do not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the Refuge. The disturbance from these activities is limited to approximately 10 percent or less of the Refuge, and they enhance the connection and appreciation of wildlife and wild lands to Refuge visitors. These visitors are potential partners and a potential source of support for the Refuge and the Refuge System. Disturbance from these activities is not expected to adversely impact wildlife populations. Most wildlife observation is confined within a set distance from existing roadways, and in some locations infrastructure helps to concentrate the use in areas that can allow wildlife observation and photography opportunities at safe distances and that minimize wildlife disturbance.

Signature: Refuge Manager: _____

(Signature and Date)

Concurrence: Regional Chief: _____

(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Environmental Education

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

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Description of Use: Environmental Education is a priority public use that contributes about 2,300 visits to the Refuge each year. The program is designed to complement the Missouri public schools curriculum that requires students to learn about natural resources in preparation for the annual Missouri Mastery and Achievement Test. Environmental education programs focus on Refuge specific issues including wildlife, history, archaeology, culture, and habitats. Wildlife ecology programs address a number of wildlife conservation issues including bottomland hardwood conservation, Wilderness Area management and stewardship, migratory bird management, and endangered species conservation. Programs also involve development of outdoor skills which enhance appreciation of wildlife and the habitats. Environmental educational visits commonly include a visit to the Visitor Center for a Refuge-specific, historic presentation, an interpretive walk along the 1.0-mile Boardwalk Nature Trail, lunch at the pavilion, and/or a tour along the open Refuge roadways in their school bus. In addition, many environmental education participants attend one of the Refuges special events such as Bald Eagle Days or the Butler County or Stoddard

County Ecology Days. During Ecology Days, 5th grade students from Butler and Stoddard Counties prepare in an outdoor setting for the Missouri Mastery Achievement Tests by learning about natural resources. During the two weeks, in 2004, over 600 students attended Ecology Days. Environmental education is also part of many off-site programming by staff. The Refuge has become increasingly popular as an outdoor classroom for several universities. These non-Refuge staffed activities include seining fish, wildlife observation, and collecting plants and animals for identification. In addition, Dr. Leigh Fredrickson conducts several wetland workshops on moist soil units. Several programs are conducted annually attracting over 50 wetland managers, biologist, and maintenance workers across the country. The Missouri Department of Conservation also conducts educational activities on the Refuge. In 2004, these activities included a Forest, Avian and Ecology and Management Workshop, a Birding/Fishing/Turkey Hunting educational Outdoor Women’s clinic, and a Waterfowl and Wetlands Workshop. In 2004, University of Missouri conducted a forestry class, and Missouri State conducted two reptile and amphibian educational field trips. In 2004, Visitor Services staff presented programming to 2,298 visitors of all ages. In addition, in 2004, 11,351 individuals participated in group presentations conducted by Visitor Services staff.

The Comprehensive Conservation Plan recommends additional staffing and facilities and an expanded environmental education program. With additional visitor services staffing, more students will be given an opportunity for environmental education on the Refuge. Staff will be able to provide additional teacher workshops and orientations, and help develop additional site-specific curricula, materials, and activities. Additional field trip assistance would be available to enhance learning in an outdoor setting. Students and teachers would also be able to participate in coordinated restoration, and monitoring programs through long-term monitoring studies.

Availability of Resources: Infrastructure to support this use includes the Visitor Center and associated interpretive and educational displays, the 1.0-mile Boardwalk Nature Trail, the pavilion, Visitor parking lot, the 19-mile long Auto Tour Route and the Red Mill and Sand Blow Ridge Roadways totaling 8 miles, Maintenance Shop, various overlooks, comfort stations, and vehicular pull-offs. The construction and maintenance of this infrastructure

supporting environmental education are the principle expenses along with the time and effort coordinating, developing, and implementing programming by Visitor Services staff. Visitor Services staff includes one full-time park ranger and one seasonal permanent park ranger. Many of these activities are conducted through the assistance of Refuge volunteers and student interns as available. The needed staff for coordinating the Refuge's environmental education program is available, but limits the number of programs and offering of special events. Maintaining the Visitor Services facilities is part of routine management duties and staff and funding is available. Additional facilities and visitors services specialists will enhance public opportunities for environmental education and improve the quality and quantity.

To help track, regulate, and analyze effects of the use, Special Use Permits are issued for groups exceeding 10 individuals and/or when programs are conducted independently of Refuge staff. In 2004, seven permits were issued under these circumstances. The permit issuances increase overall costs of Refuge operations, including but not limited to, development and review of policy and procedure, yearly administration of permits (inquiries, screening applicants, issuing permits), and enforcement of permit conditions. In the short-term, existing staff is adequate. However, the number of permits issued will have to be limited in balance with staff resources. In the long-term, additional administrative and/or other personnel as identified in the Comprehensive Conservation Plan will be needed.

Anticipated Impacts of the Use: Disturbance of wildlife is the primary concern regarding this use. Disturbance to wildlife, such as the flushing of feeding, resting, or nesting birds, is inherent to the activities including walking the Boardwalk Nature Trail or touring the Refuge in the school vans or buses. There is some temporary disturbance to wildlife due to human activities on trails; however, the disturbance is generally localized and will not adversely impact overall populations. Increased facilities and visitation would cause some displacement of habitat and increase some disturbance to wildlife, although this is expected to be minor given the size of the Refuge and by avoiding or minimizing intrusion into important wildlife habitat by seasonal and/or locality restrictions.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment

for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

_____ Use is Not Compatible

X Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility:

1. Environmental education activities not led by Refuge staff require a special use permit to minimize conflicts with other groups, safeguard students and resources, to track the use, and minimize disturbance. When collection of species is part of the trip, a species encountered list is required to be submitted to the Refuge.
2. Environmental education (including Refuge-conducted) will not be allowed in Closed Areas of the Refuge from October 1 to March 1.
3. Educational groups are required to have a sufficient number of adults to supervise their group, a minimum of 1 adult per 12 students.

Justification: In view of the above and with the stipulations previously described, environmental education will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Environmental education occurs and utilizes facilities in strategic locations to provide quality opportunities while limiting wildlife and habitat disturbance. Disturbance is generally short-term, only temporarily displaces wildlife, and does not adversely impact overall populations. Also, adequate adjacent habitat is usually available for temporarily displaced wildlife. The approval process for groups will limit disturbance to wildlife and ensure avoidance of sensitive areas. Numerous other stipulations will be in place to facilitate these uses while reducing direct and indirect impacts. As one of the six priority public uses of the Refuge system, this use is to be encouraged when compatible with the purposes of the Refuge. The Refuge provides outstanding environmental education opportunities due to the diversity of wildlife and habitat on the Refuge, and the range of environmental issues affecting and influencing the Refuge. For example, the vast bottomland hardwood forest and Congressionally designated Wilderness Area provide a sub-

ject for environmental education exploration. Educating students of all ages about the resources and challenges of the Refuge is an important way to influence the future well-being of the Refuge. Through understanding and appreciation, people may be moved to personal and collective action to ensure a healthy Refuge for the future.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Interpretation and Special Events

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-orientated recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Interpretation is one of the Refuge’s priority public use activities. Interpretation on the Refuge focuses on self-guided exhibits and interpretive panels and brochures including pamphlets associated with the Boardwalk Nature Trail and the Auto Tour Route. The Boardwalk Nature Trail is an interpretive 1.0-mile trail that leads to a disabled accessible platform overlooking the Rockhouse Marsh. In 2004, over 16,000 visits to the Boardwalk Nature Trail occurred. Visitor Center exhibits include audio-visual programming, dioramas, and displays on wildlife management, swamp ecology, archaeology, geology, and history. In FY 2004, over 8,000 individuals visited the Visitor Center exhibits, over 6,000 visits occurred to the interpretive Auto Tour Route, and over 21,000 individuals visited Refuge kiosks and overlooks interpreting a variety of information pertaining to the specific location and the Refuge as a whole. The Refuge hosts special events focusing on environmental topics and Refuge specific activities. On-site special events include: Bald Eagle Days, Kid’s Free Fishing Day, Migratory Bird Day, National Public Lands Day, and National Wildlife Refuge Week. Every special event focuses on a Refuge specific

interpretive message. Off-site special events conducted by staff include staffed exhibit at the Southeast Missouri District Fair in cooperation with the Missouri Department of Conservation (MO DOC). This event contacts over 25,000 individuals each year. In addition, Refuge personnel annually attend off-site presentations in which interpretive displays are utilized and staff members present interpretive materials and programs, while interacting directly with the public. In 2004, over 9,000 individuals were contacted by Refuge staff off-site. Every other year, the Refuge and MO DOC host Eagle Days. The Event includes educational programming in six 50-minute programs for students within a 60 mile radius of the Refuge, during the opening day and an additional six presentations the following day to the general public. Bald Eagle Days attract over 800 individuals annually. The programs are based on general bald eagle life history information, recovery efforts, and other interesting eagle facts. Interpreting the resources and challenges of the Refuge to both the public of all ages is an important way to influence the future well-being of the Refuge.

Interpretive visits occur throughout the year at the kiosks, trails, the Visitor Center, Auto Tour Route, and observation overlooks. Interpretive signs are the most commonly used method of interpretation on the Refuge. These signs convey site-specific messages at visitors’ convenience since they are available any season or time of day. Interpretive signs are used along the 19-mile Auto Tour Route, Red Mill Drive, hiking trails, and overlook areas of the Refuge. In addition, 10 kiosks, 2 entrance signs, and 4 notice boards provide information about the Refuge. The Refuge Auto Tour Route is available from March 1st through November 30th. It promotes interpretation and winds its way along the border of the Wilderness Area, through the bluffs and swamp-land, and popular wildlife observation areas of the Refuge. Several college groups schedule annual outings to the Wilderness Area in which Refuge staff conduct interpretive programs.

Availability of Resources: Interpretive signs are found along the Auto Tour Route and Red Mill Drive and self-guided interpretive pamphlets are available through a brochure dispenser located at the beginning of the Auto Tour Route.

Currently, there are one full-time and permanent part time visitor services staff members for the entire Refuge. The needed staff for coordinating the interpretive programs and special events is available, but limits the number of guided or facilitated

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Miles Open	28	28	34	34	35	35	35	35	35	28	28	28
Acres Affected	1,700	1,700	2,060	2,060	2,120	2,120	2,120	2,120	2,120	1,700	1,700	1,700
Percent of Refuge Affected	7.9	7.9	9.5	9.5	9.8	9.8	9.8	9.8	9.8	7.9	7.9	7.9

programs. Maintaining the public use facilities is part of routine management duties and staff and funding is available. Additional facilities and visitors services specialists, as proposed in the Comprehensive Conservation Management Plan, will enhance public opportunities for these uses and improve the quality and quantity of programs.

To help track, regulate, and analyze effects and impacts of the use, Special Use Permits are issued for groups exceeding 10 individuals and/or when programs are conducted independently of Refuge staff. Administering Special Use Permits for groups exceeding 10 individuals increases overall costs of Refuge operations, including but not limited to: development and review of policy and procedure, yearly administration of permits (inquiries, screening applicants, issuing permits), and enforcement of permit conditions. In the short-term, existing staff is adequate. However, the number of permits issued will have to be limited in balance with staff resources. In the long-term, additional administrative and/or other personnel as identified in the Comprehensive Conservation Plan will be needed.

Anticipated Impacts of the Use: Disturbance of wildlife is the primary concern regarding interpretation and special events. Interpretive activities that are Refuge-based can cause wildlife disturbance during the activity. This includes the Auto Tour Route, the Boardwalk Nature Trail, and roadside exhibits. While engaged in these activities, traveling roadways and accessing and using overlooks and other infrastructure contribute to wildlife disturbance. Special Events often include large groups that utilize a specific location. Concentrating the use in specific location minimizes wildlife disturbance.

Overall, there is little disturbance to migrating waterfowl, because these activities are prohibited in areas where waterfowl concentrate during annual migrations. Wildlife disturbance at other times and throughout the Refuge is more difficult to assess.

Studies by Blumstein¹ and Blumstein et al.² show that 'flight-initiation-distance' varies by species and intruder starting distance as well as by things such as flock size, angle of approach, time of year, time of

day, reproductive state, distance to refuge, and type of disturbance. Given these complexities, it is not possible to determine the level of disturbance generated by each activity. It is likely there is a zone of influence on either side of existing travel ways where some level of wildlife disturbance occurs from all sources.

There are no specific studies regarding wildlife disturbance at Mingo, but in a study conducted in and around Boulder, Colorado, Miller et al.³ found that composition and abundance of birds were altered adjacent to trails in both grassland and forest ecosystems. The authors noted the cause could be the physical presence of the trail, associated human disturbance, or both factors acting in concert. These effects, for most bird species, were largely confined to a zone of influence extending approximately 250 feet on either side of trails and may be less pronounced in areas with less human development and recreational use than the study area.

We applied this concept as one measure of potential wildlife disturbance along travel ways open to interpretation at Mingo. The table below shows amount of travel ways open to this activity as well as the associated zone of influence (250 feet on either side of travel ways) in both acres and percentage of the Refuge. These travel ways are also open to wildlife observation, wildlife photography, horseback riding, hiking, recreational biking, and jogging. In any month, less than 10 percent of the Refuge is affected by these activities.

The Boardwalk Nature Trail (1 mile) is a popular location for interpretation. The zone of influence

1.¹Blumstein, D.T. 2003. Flight initiation distance in birds is dependent on intruder starting distance. *J. Wildl. Manage.* 67:852-857.

2.Blumstein, D.T., L.L. Anthony, R.G. Harcourt, and G. Ross. 2003. Testing a key assumption of wildlife buffer zones: is flight initiation distance a species-specific trait? *Biological Conservation* 110:97-100.

3.Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. 8(1):162-169

totals approximately 60 acres (.28 percent of the Refuge) for this additional trail.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility:

1. Interpretive programming and special events will focus on unique attributes of the Refuge including: rich abundance and diversity of amphibians and reptiles, waterfowl, ditch system and water management, bottomland hardwood ecology, and foster a respect and appreciation of the National Wildlife Refuge System and the Refuge specifically.
2. Groups greater than 10 individuals are required to possess a Special Use Permit.
3. Along 13 miles of the Auto Tour Route, vehicular access from March 1 through November 30 will occur except for closure during the State firearm deer season and as needed for reptile and amphibian migrations.
4. A 6-mile portion of the Auto Tour Route will be open year-round to vehicular traffic.

Justification: In view of the above and with the stipulations previously described, interpretation and special events will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. The disturbance from interpretation and special events is limited to approximately 10 percent or less of the Refuge, and it enhances the connection and appreciation of wildlife and wild lands to Refuge visitors. These visitors are potential partners and a potential source of support for the Refuge and the Refuge System. Disturbance from these activity are not expected to adversely impact wildlife populations. Most interpretation and special event programming is confined to specific infrastructure, roadside exhibit,

Boardwalk Nature Trail or along the Auto Tour Route. This helps to concentrate the use in areas at safe distances and minimize wildlife disturbance.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Boating, Canoeing, and Kayaking

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Boating, canoeing, and kayaking on the Refuge is associated with fishing, wildlife viewing of the Old Mingo River, Stanley Creek, and marsh habitats, and environmental education. Presently, approximately 1,200 visits per year are associated with boating, canoeing, and kayaking. This is expected to increase to 2,100 visits per year over the next 15 years. The expected increase is associated with a 5-month seasonal extension of the Auto Tour Route called for in the CCP. It extends the duration boaters, canoeists, and kayakers have vehicle access to launch points otherwise accessible only by over land portage.

All waters of the Refuge are open to use from March 1st until September 30th. Boating, canoeing, and kayaking is offered from March 1st to September 30th in the area north of Ditch 11 between and including Ditch 2 and Ditch 6. They are offered year round on Ditch 1, Ditch 2, Ditch 6, Ditch 11, Mingo River, Job Corps Lake, Stanley Creek, May Pond, Fox Pond, and Red Mill Pond. Ditch 3, 4, 5, Monopoly Marsh, Gum Stump, and Rockhouse Marsh are closed to all use from October 1st until March 1st.

Electric motors are allowed outside the Wilderness Area.

Availability of Resources: Maintenance costs of the facilities to support these activities include law enforcement patrol and launch maintenance (gravel placement) at Flat Banks, May Pond, and Fox Pond. Existing staffing and funding are adequate to support these activities. Occasionally, volunteer assistance is used for litter clean up and keeping the canoe route open.

Anticipated Impacts of the Use: Restricting boating, canoeing, and kayaking by establishing time and location restrictions avoids conflicts with peak waterfowl migration periods. Allowing only paddles or electric trolling motors, minimizes noise disturbance. Additional restrictions are placed in the Wilderness Area and no electric trolling motors are allowed. This includes portions of the Old Mingo River, Stanley Creek, Monopoly Marsh, Ditches 4, 5, 6, and 10. These regulations are expected to reduce wildlife disturbance, be of short duration, and minimize disruption of natural processes as required by the Wilderness Act.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility:

1. All motors including electric trolling motors can not be used inside the Wilderness Area.
2. All regulations pertaining to watercraft use on the Refuge must be abided by as printed in the Refuge regulations governing watercraft activities.
3. Controlled access and seasonal stipulations may be adjusted when necessary to ensure protection to migratory waterfowl.

Justification: The use of boats, canoes, and kayaks can provide an appreciation of the natural character of the Refuge. This activity provides viewing and photography opportunities of wildlife and the associated habitats and less evasive to wildlife and the environment than gas-powered motors. This activity enhances the connection and appreciation of wildlife and wild lands by the Refuge visitors and provides an environmental education opportunity. With current timing and location restrictions, migratory waterfowl are protected from negative impacts of this use during the waterfowl peak usage period of the Refuge.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Horseback Riding, Recreational Biking, Hiking, and Jogging

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-orientated recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Horseback riding, recreational biking, hiking, and jogging are permitted on selected Refuge roadways throughout the year, from ½ hour before sunrise until ½ hour after sunset. Roads west of Ditch 6, the Bluff Road, and Red Mill Drive are available throughout the year. A one mile road segment between May Pond and Fox Pond is available from May 15 through September 30. All other roads are available from March 1 through September 30. The Refuge Auto Tour Route is available to conduct these activities from 8:00 a.m. until 4:00 p.m. throughout the year. Horseback riders and recreational bikers range from single individuals to groups of 25 or more for special events.

Availability of Resources: Groups greater than 10 individuals are required to obtain a special use permit, which requires administrative time to complete. However, a fee is charged to off-set this cost. Additional expenses include compliance inspections conducted by Refuge law enforcement personnel. Existing staffing and funding are adequate to support these activities.

Anticipated Impacts of the Use: Wildlife disturbance is associated with all of the activities. There is little disturbance to migrating waterfowl because these activities are prohibited in areas where waterfowl concentrate during annual migrations. Wildlife disturbance at other times and throughout the Refuge is more difficult to assess. Studies by Blumstein¹ and Blumstein et al.² show that ‘flight-initiation-distance’ varies by species and intruder starting distance as well as by things such as flock size, angle of approach, time of year, time of day, reproductive state, distance to refuge, and type of disturbance. Given these complexities, it is not possible to determine the level of disturbance generated by each activity. It is likely there is a zone of influence on either side of existing travel ways where some level of wildlife disturbance occurs from all sources.

There are no specific studies regarding wildlife disturbance at Mingo, but in a study conducted in and around Boulder, Colorado, Miller et al.³ found that composition and abundance of birds were altered adjacent to trails in both grassland and forest ecosystems. The authors noted the cause could be the physical presence of the trail, associated human disturbance, or both factors acting in concert. These effects, for most bird species, were largely confined to a zone of influence extending approximately 250 feet on either side of trails and may be less pronounced in areas with less human development and recreational use than the study area.

We applied this concept as one measure of potential wildlife disturbance from horseback riding recreational biking, hiking, and jogging at Mingo. The table below shows amount of travel ways open to these activities as well as the associated zone of influence (250 feet on either side of travel ways) in both acres and percentage of the Refuge. In any month, less than 10 percent of the Refuge is affected by these activities.

1. Blumstein, D.T. 2003. Flight initiation distance in birds is dependent on intruder starting distance. *J. Wildl. Manage.* 67:852-857.

2. Blumstein, D.T., L.L. Anthony, R.G. Harcourt, and G. Ross. 2003. Testing a key assumption of wildlife buffer zones: is flight initiation distance a species-specific trait? *Biological Conservation* 110:97-100.

3. Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. 8(1):162-169

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Miles Open	28	28	34	34	35	35	35	35	35	28	28	28
Acres Affected	1,700	1,700	2,060	2,060	2,120	2,120	2,120	2,120	2,120	1,700	1,700	1,700
Percent of Refuge Affected	7.9	7.9	9.5	9.5	9.8	9.8	9.8	9.8	9.8	7.9	7.9	7.9

Additionally, soil impacts and spread of invasive species are associated with horseback riding. Confining horse use to surfaced roadways, as is the case at Mingo, limits soil impacts such as erosion and compaction. Although horses routinely travel Refuge roads, there is no evidence of soil impacts on these designated roadways.

Horses as well as hikers, pets, and seasonal flooding are among the invasive plant species vectors identified by the Invasive Species Pathway Team¹. Although horses likely do transport viable seeds along travel routes it is probable that seeds arrive by other vectors as well, including annual flood events. A 2001 study² conducted in southern Illinois showed that seeds transported via horse dung did germinate along trails. But the authors concluded that invasive species along horse trails posed a limited threat to the adjacent forested ecosystem because none moved beyond the trail. This matches well with what is seen at Mingo.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility:

1. All horseback riders, bikers, hikers, and joggers must remain on the existing roadways and not establish side trails through portions of the Refuge. Off-road riding is prohibited.
2. Offer year round access for horseback riding, recreational biking, hiking, and jogging along the entire 19-mile length of the Auto Tour Route and along the entire 5-mile length of Red Mill Drive.
3. Offer year round access for horseback riding, recreational biking, hiking, and jogging along the entire 3-mile length of Sand Blow Ridge Road.
4. Offer seasonal access from March 1 through September 30 for horseback riding, recreational biking, hiking, and jogging along a 6-mile loop between Ditch 3 and Ditch 4.
5. Offer seasonal access from May 15 through September 30 for horseback riding, recreational biking, hiking, and jogging on the 1 mile road segment between May Pond and Fox Pond.
6. Offer year round access for horseback riding, recreational biking, hiking, and jogging along a 6-mile length of Bluff Road.
7. Evaluate and authorize horseback riding, recreational biking, and jogging involving group events through a permitting process.
8. Horseback riding, recreational biking, hiking, and jogging is not allowed in the Managed Deer Hunt Area during the special hunt, for public safety.
9. Horseback riding, recreational biking, hiking, and jogging is restricted to ½ hour before sunrise until ½ after sunset to minimize disturbance to wildlife and to ensure participants' safety. The Auto Tour Route is restricted to 8:00 a.m. until 4:00 p.m..

1.Campbell, F. and Kriesch. 2003. *Invasive Species Pathways Team. Final report. Available at www.invasivespecies.gov/council/pathways.doc* (accessed 9 September 2005)

2.Campbell, J.E. and Gibson, D.J. 2001. *The effect of seeds of exotic species transported via horse dung on vegetation along trail corridors. Plant Ecology 157:23-35.*

10. All trailers and vehicles to assist in these activities must be parked in designated parking areas.
11. Horseback riding, recreational biking, hiking, and jogging for competition is not compatible for it does not support wildlife observation opportunities, but serves an alternative purpose that is not wildlife dependant.
12. All individual horseback riders, recreational bikers, hikers, and joggers, who enter onto the Refuge by foot, bike, or horse, must possess an individual recreational user permit. Those entering by vehicle and/or trailer must possess a user permit per vehicle. Groups with greater than 10 individuals are required to have a group events recreational user permit.

Justification: While not listed as primary, wildlife-dependent recreational uses under the National Wildlife Refuge Improvement Act, as amended, horseback riding, recreational biking, hiking, and jogging are believed to be compatible public uses under the stipulations outlined in this compatibility determination. Primary reasons for this determination include the following: wildlife observation can be an element of these activities; horseback riders, bikers, hikers, and joggers are potential partners and a potential source of support for the Refuge; and impacts associated with these activities are not believed to exceed impacts already caused by other public use activities. In view of the above and with the stipulations previously described, horseback riding, recreational biking, hiking, and jogging will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System.

Signature: Refuge Manager: _____

(Signature and Date)

Concurrence: Regional Chief: _____

(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Firewood Harvest

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: This use occurs annually by fewer than 10 individuals and is dependent on storm related tree falls. Following storms, firewood permits are issued as requested to collect fallen timber. The wood is to be used only for personal use and not sold for profit. Only fallen trees blocking roadways or within the right-of-way are authorized for removal.

Availability of Resources: Refuge staff time is used to issue associated special use permit and compliance inspections. The timber removal is beneficial to the Refuge, because staff would not have to remove the fallen trees, thus saving salary expenses.

Anticipated Impacts of the Use: The use occurs adjacent to existing roadways. The use is short duration with some noise disturbance for the operation of chainsaws. Overall the wildlife disturbance is minimal. Some cover for small mammals and reptiles is removed; however, the Refuge bottomlands provide ample opportunities despite this removal. The majority of removed timber has fallen too close to facilities and/or across roadways, where wildlife use is already restricted.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

_____ Use is Not Compatible

 X Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility: All timber removal is authorized by Refuge Manager through issuance of a special use permit. No motorized vehicles can be used beyond existing roadway. No firewood removal is authorized within the Wilderness Area.

Justification: Harvesting firewood within prescribed guidelines will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Issuing special use permits for the removal of firewood reduces road maintenance costs and frees maintenance staff to focus on other activities.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Gathering Wild Edibles: Berry, Mushroom, Pokeweed

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Berry, mushroom, and pokeweed leaves are seasonally collected on the Refuge for personal use. This occurs without ground disturbance in areas south of Ditch 11 and east of Ditch 6 from March 1st to September 30th along road sides, edges of fields, and bottomland forests. Harvest is typically during a stretch of several days in early spring and summer as particular items ripen. These foods are hand harvested by picking the products from the plant or gathering what has fallen to the ground. Mushrooms are picked by hand in the spring. Harvest is during daylight hours and generally involves individuals or small groups. Access to harvest sites is typically accomplished by walking from a parking area or along the side of Refuge roadways. For some people, this is a traditional, family-oriented activity which provides an opportunity for those participating to collect wholesome foods while enjoying the natural environment. It may take place in conjunction with other activities that are wildlife-dependent such as wildlife observation and photography.

Availability of Resources: Staff is available to maintain these facilities, enforce Refuge regulations, and provide information to the public. Administering this use can thus be done with existing resources for ongoing operations, maintenance and public information.

Anticipated Impacts of the Use: Wildlife disturbance and removal of wildlife foods are the direct impacts associated with this activity.

There is little disturbance to migrating waterfowl because wild edible gathering is prohibited in areas where waterfowl concentrate during annual migrations. Wildlife disturbance at other times is more difficult to assess. Studies by Blumstein¹ and Blumstein et al.² show that ‘flight-initiation-distance’ varies by species and intruder starting distance as well as by things such as flock size, angle of approach, time of year, time of day, reproductive state, distance to refuge, and type of disturbance. Given these complexities, and that vehicles, horseback riders, bikers, hikers, and joggers, traverse the same travel ways it is not possible to determine the level of disturbance generated by each activity. It is likely there is a zone of influence on either side of existing travel ways where some level of wildlife disturbance occurs from all sources.

There are no specific studies regarding wildlife disturbance at Mingo, but in a study conducted in and around Boulder, Colorado,³ Miller et al. found that composition and abundance of birds were altered adjacent to trails in both grassland and forest ecosystems. The authors noted the cause could be the physical presence of the trail, associated human disturbance, or both factors acting in concert. These effects, for most bird species, were largely confined to a zone of influence extending approximately 250 feet on either side of trails and may be less pronounced in areas with less human development and recreational use.

1. Blumstein, D.T. 2003. Flight initiation distance in birds is dependent on intruder starting distance. *J. Wildl. Manage.* 67:852-857.

2. Blumstein, D.T., L.L. Anthony, R.G. Harcourt, and G. Ross. 2003. Testing a key assumption of wildlife buffer zones: is flight initiation distance a species-specific trait? *Biological Conservation* 110:97-100.

3. Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. 8(1):162-169

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Miles Open	28	28	34	34	35	35	35	35	35	28	28	28
Acres Affected	1,700	1,700	2,060	2,060	2,120	2,120	2,120	2,120	2,120	1,700	1,700	1,700
Percent of Refuge Affected	7.9	7.9	9.5	9.5	9.8	9.8	9.8	9.8	9.8	7.9	7.9	7.9

Wild edible gathering permitted along 5 miles of roadsides south of Ditch 11 and east of Ditch 6
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We applied this concept as one measure of potential wildlife disturbance from visitor activities at Mingo. The table below shows amount of travel ways open to horseback riding, recreational biking, hiking, and jogging as well as the associated zone of influence (250 feet on either side of travel ways) in both acres and percentage of the Refuge. In any month, less than 10 percent of the Refuge is affected by these activities. Wild edible gathering occurs concurrently with these activities, but affects fewer acres because it is confined to a 5-mile subset of the roads open to the other activities.

Historically, public participation in the collection of plant food products on the Refuge has been less than 200 visits per year, and future participation is also expected to be at or below the current level. Individuals gathering wild edibles are limited to ½ gallon per day of mushrooms and 5 gallons per day of pokeweed. This is not anticipated to adversely impact the ecological integrity of the Refuge. Archeological evidence from within the Refuge shows it has been inhabited by humans for more than 12,000 years. Many of the early inhabitants relied heavily on wild plants for food. It is reasonable to conclude that individual gathering today is consistent with the historic conditions of the area.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. All collections must occur outside the Wilderness Area and within designated area (south of

Ditch 11 and east of Ditch 6) from March 1st until September 30th.

2. Digging of plants or their roots is prohibited.
3. Plant products are for personal use only and cannot be sold or traded.
4. Quantities are restricted to the gathering of one-half gallon per day of mushrooms and berries and five gallons per day of pokeweed.
5. Damaging trees, shrubs or any other vegetation is prohibited.
6. The host plant can not be destroyed or removed.

Justification: The use has little impact to wildlife or habitat since it is non-motorized, involves few visitors, and disturbance is local and short-duration. Little harvest occurs in the fall which is the beginning of the peak of the waterfowl migration. Due to the relatively small number of visitors for this activity and the personal use only stipulation, the amount of plants or parts harvested will not create any shortage of wild foods for any particular wildlife species. Refuge infrastructure and law enforcement staff already in place will be sufficient to facilitate and administer this use into the future. In view of the above and with the stipulations previously described, gathering wild edibles (berries, mushrooms, and pokeweed) will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System.

Signature: Refuge Manager: _____

(Signature and Date)

Concurrence: Regional Chief: _____

(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Research by a Third Party

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-orientated recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: The Refuge allows research on a variety of biological, physical, and social issues and concerns to address refuge management information needs or other issues. Studies are conducted by federal, state, and private entities, including the U.S. Geological Survey, Missouri Department of Conservation, state and private universities such as the Gaylord Lab of University of Missouri, and independent researchers and contractors. Each year, the Refuge issues Special Use Permits (SUP) for biological and physical research studies. In FY 2004, a total of seven SUPs was issued for a variety of research including: an investigation on the growth and longevity of sirens conducted by an independent researcher; a bottomland hardwood forestry inventory conducted by the U.S. Forest Service, a fisheries inventory of the Wilderness Area conducted by Missouri Department of Conservation, an all encompassing survey of flora and fauna of the Stanley Creek and Mingo River areas conducted by the Missouri Department of Conservation for the Missouri Natural Areas Committee, a bat call and response study conducted by University of Missouri at Columbia, a wood duck nest box activity and tagging research conducted by the Gaylord

Lab of the University of Missouri at Columbia, bottomland hardwood regeneration study conducted by a graduate student of University of Missouri at Columbia, and an ozone injury survey conducted by Penn State University. Research study sites, sampling locations, and transects are temporarily marked by highly visible flagging, wooden or metal posts that must be removed when research ceases. Access to study sites is by foot, truck, boat, airboat, canoe, and other watercraft. Vehicle use is allowed on Refuge roads, trails, and parking lots normally open to the public. Nearly all the Refuge is open for authorized research activities throughout the year with the exception that researchers may not enter, unless specifically authorized, Closed Areas during the waterfowl hunting season.

Availability of Resources: The Refuge uses existing staff to issue Special Use Permits for research projects that occur on the Refuge. Currently, staff resources are deemed adequate to manage this use at anticipated use levels. Review of the use, drafting and issuing the SUP, and compliance assessments utilize on average 3 hours of staff time per permit. Access points, boats, other vehicles, miscellaneous equipment, and limited logistical support are available on the Refuge and subject to usage by Refuge Manager’s discretion. Temporary housing located at the Refuge and is available for use by researchers while studying Refuge resources as at the Refuge Manager’s discretion.

Anticipated Impacts of the Use: Research activities may disturb fish and wildlife and their habitats. For example, the presence of researchers can cause waterfowl to flush from resting and feeding areas, cause disruption of birds and turtles on nests or breeding territories, or increase predation on nests and individual animals as predators follow human scent or trails. Efforts to capture animals can cause disturbance, injury, or death to groups of wildlife or to individuals. To wildlife, the energy cost of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expended to avoid disturbance. Sampling activities can cause compaction of soils and the trampling of vegetation, the establishment of temporary foot trails and boat trails through vegetation beds, disruption of bottom sediments, and minor tree damage when temporary observation platforms are built or marking locations. The removal of vegetation or sediments by core sampling methods can cause increased localized turbidity and disrupt non-target plants and animals. Installation of posts, equipment platforms, collec-

tion devices, and other research equipment may present a hazard to heavy equipment operators if said items are not adequately marked and/or removed at appropriate times or upon completion of the project. Research efforts may also discover methods that result in a reduction in impacts described above.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

_____ Use is Not Compatible

 X Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility:

1. Prior to conducting investigations, researchers will obtain a Special Use Permit from the Refuge that contains specific stipulations related to when, where, and how the research will be conducted. The Refuge Manager retains the option to prohibit research on the Refuge which does contribute to the purposes of the Refuge or the mission of the Refuge System, or causes undo resource disturbance or harm.
2. Researchers must possess all applicable State and Federal permits for the capture and possession of protected species, for conducting regulated activities in wetlands, and for other regulated activities.
3. Researchers will submit findings, such as annual status reports or a final report, in a timely manner to the Refuge Manager for inclusion in the decision-making and management process.
4. Researchers are restricted from the Refuge Closed Areas during the waterfowl migration period from October 1 until March 1, except at pre-arranged, specific times and locations as authorized allowed by the Refuge Manager.
5. Researchers must clearly mark posts, equipment platforms, fencing material, and other equipment left unattended to reduce the hazard. Such items shall be removed promptly upon completion of the research.
6. Research involving collections will be extremely restricted. Collections will be limited to type or voucher specimens only and require pre-approval by the Refuge Manager. Species may not be collected in the Wilderness portion of the Refuge without specifically addressing the justification for the exclusive need to collect from this portion of the Refuge prior to collecting.

Justification: In view of the above and with the stipulations previously described, research activities will not materially interfere with or detract from the purposes of the Refuge or the missions of the Refuge System. Research by third parties plays an integral role in Refuge management by providing information needed to manage the Refuge on a sound scientific basis. Investigations into the biological, physical, archeological, and social components of the Refuge provide a means to analyze management actions, impacts from internal and outside forces, and ongoing natural processes on the Refuge environment. Research provides scientific evidence as to whether the Refuge is functioning as intended. Adverse impacts of research that cause localized vegetation trampling or disruption of wetland soils and bottom sediments are often short-term and will be minimized through stipulations above. Vehicular access is allowed only on roads and trails normally open to the public, thus resulting in no net increase in vehicular impacts. Researches are also restricted from Closed Areas and sanctuaries to avoid and minimize human disturbance to feeding and resting waterfowl. Any research equipment that remains in the field for the duration of the project will be clearly marked to avoid potential hazards presented to Refuge staff and other Refuge users.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Farming

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for 1) incidental fish and wildlife-orientated recreational development, 2) the protection of natural resources, 3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: The Refuge will allow farming by private individuals for the purpose of habitat management. Cooperative farming is the term used for cropping activities (growing agricultural products) conducted by a third party on land that is owned by or managed as part of the Refuge. Cooperative farming is conducted under the terms and conditions of a Cooperative Farming Agreement or Special Use Permit issued by the Refuge Manager. The terms of the Agreement or Permit ensure compliance with Service policy and area-specific stipulations to meet management objectives and safeguard resources. In most circumstances where farming is permitted, the use agreement will require a portion of the crop be left unharvested in the field (typically 25-33%) for the benefit of wildlife. Cash rent, in lieu of crop share, may be considered by the Refuge Manager, and implemented with justification.

Farming occurs on approximately 2-3 percent of Refuge lands annually. At Mingo, farming is used as a low cost means to maintain open habitats and reduce the amount of undesirable herbaceous and woody vegetation within moist soil management units and grassy openings. On some sites it is used

to provide supplemental food for wildlife. Farming may also occur if parcels containing currently farmed land are purchased as additions to the Refuge. However, over the long term we expect the amount of farmed Refuge lands will decrease as permanent native habitat is established on these areas.

Farming entails the use of mechanical equipment such as tractors, disks, and seeders. Each site is tilled prior to spring planting, once ground conditions permit the use of heavy equipment without damage to the soil. Tilling requires 1-2 days per site. Some sites may also be treated with herbicide prior to planting. Next, crops such as corn, milo, and soybeans are planted. Typically, planting is completed in one day or less on any individual site and planting on all sites usually begins as early as mid April and is completed as late as early July depending on soil conditions and type of crop planted.

The Refuge encourages the use of no-till farming, also known as conservation tillage. This method is practiced on about half of the sites annually. It is a way of growing crops from year to year without disturbing the soil through tillage. Tillage is the preparation of the soil to receive seeds, usually done with equipment such as a plow, disk, or harrow that is pulled behind a tractor. Tilling can lead to unfavorable effects like soil compaction from heavy machine traffic and erosion caused by pulverizing the soil and removing plant cover, allowing topsoil to easily blow away or run off in rainwater. In no-till farming the soil is left intact and crop residues—stalks, stubble, leaves, and seed pods left after harvesting—are left in the fields. Despite the advantages to soils, no-till farming usually requires planting herbicide-resistant crop plants and then chemically weeding with herbicides. Herbicide may be applied up to two times annually on each site. This is usually done with a tractor-drawn sprayer or self-propelled sprayer and requires up to one day per site for each application.

Traditional farming which uses tillage, and often herbicide as well, is practiced on about half the sites annually. It entails disking the site one or more times before spring planting to remove competing vegetation. This requires 1-3 days per site. Later in the growing season herbicide is applied to reduce the amount of weedy competition. This takes up to one day per site for each application. A harrow or other tractor-drawn implement may be used in place of herbicide to reduce the amount of weedy

Heavy Equipment Use Days Per Site for No-till and Conventional Farming

Activity	No-till Farming	Conventional Farming
Spring tilling	1-2 days	1-3 days
Spring planting	1 day	1 day
herbicide application	2 days	
Herbicide application or mechanical weeding		1 day
Harvesting	1 day	1 day
Total	5-6 days/year	4-6 days/year

competition. This also would require about one day per site.

Harvest techniques are the same for both no-till and traditional farming practices. Harvest begins in the fall, using a self propelled harvesting implement such as a combine, and usually takes about one day per site and is complete on all sites by late October.

Availability of Resources: The needed staff time for development and administration of a cooperative farming program is available. Most of the needed work to prepare for this use would be done as part of routine management duties. The decision to use cooperative farming as a management tool would occur as part of strategies developed under specific program or unit habitat management planning. The additional time needed to coordinate issuance and oversight of the needed Special Use Permit or Agreements is relatively minor and within existing Refuge resources.

Anticipated Impacts of the Use: On sites where farming occurs there would be periodic short-term disturbance and displacement typical of any noisy heavy equipment operation. These sites may be used by wildlife for feeding and resting at times equipment is not operating, but successful nesting is unlikely because of soil and habitat disturbance. Soil disturbance from farming would reduce undesirable plant species in moist soil units and grassy openings allowing native species that provide dense cover and foods of high nutritive value to flourish in years the sites are not farmed. The crops left on-site as well as other crop residue would provide supplemental food, attracting wildlife to sites, where at some locations, it could be easily viewed by Refuge visitors. Any herbicide application would be done with products approved by the Service for such use and in compliance with label instructions. No short-term or long-term adverse impacts are expected. Farming and any associated impacts are expected to occur on 2- 3 percent of Refuge lands annually.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. Cooperative Farming Agreements will be issued annually and will be highly regulated to minimize damage to natural resources and provide supplemental food source.
2. Cooperating farmers will be subject to Service policy and regulation regarding use of chemicals. Herbicide and pesticide use is restricted by type and to the minimum necessary amount applied.
3. Special conditions of Cooperative Farming Agreements will address unique local conditions as applicable.
4. Farming must meet specific habitat and related wildlife objectives and contribute to the purposes of the Refuge.
5. Planting and harvest activities are restricted to minimize disturbance of wildlife species.

Justification: Maintaining open habitats through cooperative farming contributes to the achievement of Refuges purposes and the National Wildlife Refuge System mission because it partially restores historic habitat conditions found in bottomland forests, provides supplemental food for wildlife, and

creates wildlife viewing opportunities. Specifically, farming is used at Mingo in the following ways.

Moist Soil Units

Moist soil management is a widespread practice for producing a diverse mixture of native herbaceous plant foods and invertebrates that has its origins at Mingo National Wildlife Refuge¹. In addition to annual flooding, moist soil units require periodic ground disturbance to reduce the amount of undesirable vegetation. Frederickson and Taylor¹ learned from studies conducted at Mingo NWR that moist soil areas must be dried and disked to remove unwanted woody species. Cooperative farming offers a low cost means for achieving this, and in any given year approximately one third of the 653 acres under moist soil management are cropped through cooperative farming agreements.

Openings and Food Plots

The Refuge is situated at the interface of the Ozark Highlands and Crowley's Ridge, encompassing portions of each along with the bottomlands between. Temporary and permanent forest openings are part of the historic vegetative condition of the Refuge. Fire, wind, and other disturbance agents likely kept about 3-5 percent (450-750 acres at Mingo NWR) of bottomland forests in temporary openings referred to as tree-gaps.^{2,3,4,5} Caused by death or windthrow of one or more trees, these temporary open habitats within the forest are normally short-lived because

they are quickly colonized by herbaceous plants, shrubs, and tree seedlings. These temporary openings provide diversity within the otherwise forested matrix, and are important habitat for wildlife such as swamp rabbits and Swainson's warblers. At Mingo NWR, years of prolonged annual floods caused by poor drainage impeded colonization of tree-gaps by plants and young trees, eliminating much of this habitat. Permanent openings, largely around the perimeter of the Refuge, provide partial replacement of this lost habitat. Cooperative farming is a low cost means used to maintain about 253 acres of these openings. Farmers leave a portion of the crop that provides a supplemental food supply for resident wildlife during severe winters as well as wildlife viewing opportunities.

The Refuge bottomlands grade into the bluffs of the Ozark Highlands on the west and Crowley's Ridge on the east. Grassy openings are part of the historic vegetative condition within this portion of the Refuge (Dr. Leigh Fredrickson and Dr. Micky Heitmeyer, personal communication). Invasive species such as fescue quickly colonize these areas crowding out native species. Periodic farming is one low cost method used to disturb these sites and temporarily diminish the amount of invasive plant cover. On these sites, totaling about 205 acres, farming typically occurs for 1-2 years followed by a 2-3 year fallow period during which native species dominate.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

1. Frederickson, L.H. and T.S. Scott. 1982. Management of seasonally flooded impoundments for wildlife. U.S. Fish and Wildlife Service, Resource Publication 148.

2. Heitmeyer, M.E., R.J. Cooper, J.G. Dickson, and B.D. Leopold. 2005. Ecological relationships of warm-blooded vertebrates in bottomland hardwood ecosystems. Pages 281-306 in L.H. Fredrickson, S.L. King, and R.M. Kaminski eds. Ecology and management of bottomland hardwood systems: the state of our understanding. University of Missouri-Columbia, Gaylord Memorial Laboratory Special Publication No. 10, Puxico, MO.

3. Hartshorne, G.S. 1980. Neotropical forest dynamics. *Biotrophica* (Suppl.) 12:23-30

4. Heitmeyer, M.E., L.H. Fredrickson, and G.F. Krause. 1989. Water and habitat dynamics of the Mingo Swamp in southeastern Missouri. U.S. Fish and Wildlife Service, Fish and Wildlife Research No. 6. 26pp.

5. King, S.L. and T.J. Antrobus. 2001. Canopy disturbance patterns in a bottomland hardwood forest in northeast Arkansas. *Wetlands* 21:543-553.

COMPATIBILITY DETERMINATION

Use: Haying

Refuge Name: Mingo National Wildlife Refuge

Establishing and Acquisition Authority(ies): Migratory Bird Conservation Act and Refuge Recreation Act

Purpose(s): for the use as an inviolate sanctuary or for any other management purpose, for migratory birds, and for (1) incidental fish and wildlife-orientated recreational development, (2) the protection of natural resources, (3) the conservation or endangered species or threatened species.

In the Wilderness Area, to preserve wilderness character and devote to the public purposes of recreational, scenic, scientific, educational, conservation and historical use as primary refuge objectives permit.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: The Refuge will allow haying by private individuals for the purpose of habitat management. Haying is the cutting and processing (typically baling) of grass and forbs, with subsequent removal to an off-Refuge location. Haying will be conducted by third parties on grassy openings owned by or managed as part of the Refuge by jurisdictional agreement. Administration of haying programs will be conducted in accordance with a Habitat Management Plan. Haying activities will be subject to the terms and conditions of a Cooperative Farming Agreement or Special Use Permit issued by the Refuge Manager. The terms of the Agreement or Permit ensure compatibility through implementation of Service policy and Refuge specific stipulations.

Haying occurs on less than 1 percent of Refuge lands annually. At Mingo haying is used as a low cost means to reduce the amount of undesirable herbaceous vegetation such as fescue and other noxious weeds within grassy openings. This improves visibility for wildlife viewing and maintains open habitat which is easier and less expensive to convert to native grasses or forest should funding be available.

Over the long term we expect the amount of haying on Refuge lands will decrease as permanent native habitat is established on these areas.

The haying process typically requires 3-4 visits to each site with heavy equipment over a period of 7-10 days. Haying begins in July when standing grasses and forbs are cut and gathered into windrows using a tractor, mower, and rake; or a swather—a self-propelled mowing machine. The hay cures for 3-7 days to reduce moisture content, and is usually turned once with a tractor-drawn rake to speed and even drying. Once cured a tractor-drawn baler is used to package the windrows into bales of hay. A tractor-drawn wagon is used to collect the bales and remove them from the site.

Availability of Resources: The needed staff time for development and administration of a cooperative haying program is available. Most of the needed work to prepare for this use would be done as part of routine management duties. The decision to use cooperative haying as a management tool will occur as part of strategies developed under specific unit or program habitat management planning. The additional time needed to administer and monitor the needed Special Use Permit or Agreements is relatively minor and within existing Refuge resources.

Anticipated Impacts of the Use: On sites where haying occurs there would be periodic short-term disturbance and displacement typical of any noisy heavy equipment operation. These sites may be used by wildlife for feeding and resting at times equipment is not operating. The sites may also be used by nesting birds because in most years haying would be prohibited until July 15, a time when most birds have fledged young. Despite this it is likely that some nests and pre-fledglings would be destroyed during haying. Annually haying these sites temporarily removes much of the fescue, broom sedge, and other noxious weeds that out compete desirable plant species. This improves habitat diversity and increases the value of these sites for wildlife feeding and nesting.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

____ Use is Not Compatible

X Use is Compatible With Following Stipulations**Stipulations Necessary to Ensure Compatibility:**

1. Begin haying after July 15 to minimize disturbance to nesting migratory birds. In some years it may be necessary for haying to occur before July 15 to prevent seed dispersal of undesirable plant species.
2. Bales must be removed from the Refuge within 7 days of baling.
3. Windrowed grass left lying to dry should remain on the ground no more than 7 days prior to baling.
4. Haying must meet specific habitat and related wildlife objectives and contribute to the purposes of the Refuge.

Justification: Maintaining open habitats through cooperative farming contributes to the achievement of Refuges purposes and the National Wildlife Refuge System mission because it partially restores historic habitat conditions and creates wildlife viewing opportunities. The Refuge bottomlands grade into the bluffs of the Ozark Highlands on the west and Crowley's Ridge on the east. Grassy openings are part of the historic vegetative condition within this portion of the Refuge (Dr. Leigh Fredrickson and Dr. Micky Heitmeyer, personal communication). Invasive species such as fescue quickly colonize these areas crowding out native species. Haying is one low cost method used to disturb these sites and temporarily diminish the amount of invasive plant cover and stimulate growth of legumes. It also improves visibility for wildlife observation by Refuge visitors. In some cases haying is a low cost means to maintain open habitat for eventual conversion to native grasses or forest.

Signature: Refuge Manager: _____

(Signature and Date)

Concurrence: Regional Chief: _____

(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Wildlife Observation, Photography, Interpretation, and Environmental Education

Refuge Name: Ozark Cavefish National Wildlife Refuge

Establishing and Acquisition Authority(ies): The Endangered Species Act of 1973 (16 U.S.C. 1534(a)(2)).

Purpose(s): to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants. The particular purposes of establishing the Refuge were to:

*insure the biological integrity of Turnback Creek Cave Springs ecosystem that provides essential habitat for the threatened Ozark Cavefish, the endangered Gray Bat, and other cave-adapted amphipods, isopods, cave snails, pseudoscorpions, millipedes, and other cave organisms.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Prior to the completion of the Comprehensive Conservation Plan (CCP), the 40-acre Turnback Creek Cave parcel is closed to all public use; however, the Hearrell Springs parcel (less than 1 acre site) contains a webcam that provides viewing opportunity stationed at the Neosho National Fish Hatchery. Staff at the Hatchery maintain the video footage and provide educational, interpretive, and observation opportunity to over 40,000 visitors per year. Visitors hope to spot the elusive subterranean fish. Following the completion of the CCP and all necessary administrative requirements the Turnback Creek Cave parcel will be open to these uses from sunrise to sunset. The State managed Paris Springs Access is located adjacent to the parcel and a cooperative agreement between the Service and Missouri Department of Conservation to assist with these uses is proposed in the Draft CCP. Hatchery staff will continue to provide their assistance at the Hearrell Springs parcel. In addition to on-site public use, interpretive and educational efforts will take place with the land-

owners of the watersheds impacting the Turnback Creek and Hearrell Springs sites. Water quality implications to the unique subterranean ecosystem will be the focus along with what local landowners can do to improve water quality.

Availability of Resources: Hatchery staff provides invaluable assistance that makes these uses possible at the Hearrell Springs parcel. Without their administrative assistance, this popular attraction would not be available. With Paris Springs located adjacent to the Turnback Creek Cave, the assistance of Missouri Department of Conservation will provide additional priority public use opportunity. Ozark Cavefish NWR is a 4-hour drive away from Mingo NWR which administers the Refuge. Partner relationships are the only avenue to provide these uses and have a degree of oversight and compliance reliance. Coordinating activities with the Hatchery personnel and Missouri Department of Conservation will require 3 weeks of staff time annually along with 1 week of on-site compliance administration. Infrastructure required to conduct this use includes kiosks which will profile refuge specific regulations, partnerships, and the unique ecological significance the Ozark Cavefish represents.

Anticipated Impacts of the Use: The unique wildlife associated with this Refuge is subterranean. Direct access to the cave entrance and exit and the subterranean habitat is restricted. Only access above ground or via the web cam will occur. This will prevent direct contact with the unique subterranean habitat and associated species. Above ground disturbance will occur from trampling of the wet meadow habitat of the Turnback Creek parcel which could increase erosion along edges of the bank and wetland areas without vegetative cover. The Paris Springs Access attracts primarily spring to fall use which is reasonable to assume would also occur at the Refuge site.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are necessary to ensure compatibility:

1. Unique features of the Turnback Creek site will be monitored for impacts and all uses will be eliminated if impacts to the subterranean habitat are detected.
2. Cooperative agreements will be in place with the Missouri Department of Conservation and Neosho Fish Hatchery describing each party's responsibilities.

Justification: In view of the above and with the stipulations previously described, wildlife observation, wildlife photography, environmental education, and interpretation will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. These activities provide viewing and photography opportunities of wildlife and the associated habitats with minimum disturbance to wildlife and the environment. Educating students of all ages about the resources and challenges of the Refuge is an important way to influence the future well-being of the Refuge. Through understanding and appreciation, people may be moved to personal and collective action to ensure a healthy Refuge for the future. On-site disturbance is generally short-term, temporarily displaces wildlife to adjacent habitat and will not adversely impact overall populations. These priority wildlife dependent public use activities enhance the connection and appreciation of wildlife and wild lands.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Fishing

Refuge Name: Ozark Cavefish National Wildlife Refuge

Establishing and Acquisition Authority(ies): The Endangered Species Act of 1973 (16 U.S.C. 1534(a)(2)).

Purpose(s): to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants. The particular purposes of establishing the Refuge were to:

*insure the biological integrity of Turnback Creek Cave Springs ecosystem that provides essential habitat for the threatened Ozark Cavefish, the endangered Gray Bat, and other cave-adapted amphipods, isopods, cave snails, pseudoscorpions, millipedes, and other cave organisms.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Prior to the completion of the Comprehensive Conservation Plan (CCP), the 40-acre Turnback Creek Cave parcel and the Hearrell Springs parcel (less than 1 acre site) are closed to all public use. Following the completion of the CCP and all necessary administrative requirements the Turnback Creek Cave parcel will be open to fishing from sunrise to sunset. The State managed Paris Springs Access is located adjacent to the parcel and open to fishing. Fishing will be authorized according to existing Missouri Department of Conservation regulations and Refuge specific regulations. Fishing includes the traditional taking of fish with rod and reel from shore or boat, trotlines, limb lines, bank lines, and jugs from sunrise until sunset. Non-game fish may be taken for personal use by nets and seines. Trammel and gill nets must be attended at all times and plainly labeled. No commercial fishing is allowed. Species known to occur in Turnback Creek include: large-mouth bass, small-mouth bass, bluegill, carp, catfish, sucker, sunfish, and occasionally rock bass and crappie.

Availability of Resources: With Paris Springs located adjacent to the Turnback Creek Cave, the assistance of Missouri Department of Conservation will provide additional priority public use opportunity. Ozark Cavefish NWR is a 4-hour drive away from Mingo NWR which administers the Refuge. Partner relationships are the only avenue to provide priority public use and maintain a degree of oversight and compliance reliance. Turnback Creek runs through the Turnback Creek Cave parcel. A boat launch is available at the Paris Springs Access. Coordinating activities with the Missouri Department of Conservation will require 3 weeks of staff time annually along with 1 week of on-site compliance administration.

Anticipated Impacts of the Use: The unique wildlife associated with this Refuge is subterranean. Direct access to the cave entrance and exit and the subterranean habitat is restricted. Only access above ground will occur at the Turnback Creek parcel. This will prevent direct contact with the unique subterranean habitat and associated species. Accommodating this wildlife-dependant use is expected to result in minimal impacts. Although fishing causes mortality to fish, season dates and limits are set with the long-term health of populations in mind. Populations of most species are regularly monitored by Missouri Department of Conservation. Disturbance to wildlife may result from fishing activity. This disturbance is expected to be limited in scope and duration. Disturbance to habitat is minimal although some soil compaction and erosion can occur along bank fishing areas. Above ground disturbance will occur from trampling of the wet meadow habitat of the Turnback Creek parcel which could increase erosion along edges of the bank and wetland areas without vegetative cover. These impacts are generally localized and have little overall negative impact. The Paris Springs Access attracts primarily spring to fall use which is reasonable to assume would also occur at the Refuge site.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: To ensure compatibility with Refuge purposes and the mission of the National Wildlife Refuge System, recreational fishing can occur on the Refuge if the following stipulations are met:

1. This use must be conducted in accordance with State and Federal regulations, and applicable special Refuge regulations published in the Public Use Regulations brochure.
2. This use is subject to modification if on-site monitoring by Refuge personnel or other authorized personnel results in unanticipated negative impacts to natural communities, wildlife species, or their habitats.

Justification: In view of the above and with the stipulations previously described, fishing will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Fishing seasons and limits are established by Missouri Department of Conservation and adopted by the Refuge. These restrictions ensure the continued well-being of overall populations of fish. Fishing does result in the taking of many individuals within the overall population, but restrictions are designed to safeguard adequate population and recruitment from year to year. On-site disturbance is generally short-term, temporarily displaces wildlife to adjacent habitat and will not adversely impact overall populations. This priority wildlife dependent public use enhances the connection and appreciation of wildlife and wild lands. Fishing supports the mission of the National Wildlife Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the Refuge.

Signature: Refuge Manager: _____

(Signature and Date)

Concurrence: Regional Chief: _____

(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Hunting

Refuge Name: Ozark Cavefish National Wildlife Refuge

Establishing and Acquisition Authority(ies): The Endangered Species Act of 1973 (16 U.S.C. 1534(a)(2)).

Purpose(s): to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants. The particular purposes of establishing the Refuge were to:

*insure the biological integrity of Turnback Creek Cave Springs ecosystem that provides essential habitat for the threatened Ozark Cavefish, the endangered Gray Bat, and other cave-adapted amphipods, isopods, cave snails, pseudoscorpions, millipedes, and other cave organisms.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Prior to the completion of the Comprehensive Conservation Plan (CCP), the 40-acre Turnback Creek Cave parcel and the Hearrell Springs parcel (less than 1 acre site) are closed to all public use. Following the completion of the CCP and all necessary administrative requirements, the Turnback Creek Cave parcel will be open to hunting from ½ hour before sunrise until ½ hour after sunset. The State managed Paris Springs Access is located adjacent to the parcel and is open to hunting. Public hunting for big-game (white-tailed deer and wild turkey), upland game (bobwhite quail, gray and fox squirrel, and cottontail rabbit) is authorized according to existing Missouri Department of Conservation regulations and Refuge specific regulations.

Availability of Resources: With Paris Springs located adjacent to the Turnback Creek Cave, the assistance of Missouri Department of Conservation will provide additional priority public use opportunity. Ozark Cavefish NWR is a 4-hour drive away from Mingo NWR which administers the Refuge. Part-

ner relationships are the only avenue to provide priority public use and maintain a degree of oversight and compliance reliance. Coordinating activities with the Missouri Department of Conservation will require 3 weeks of staff time annually, 1 week of on-site compliance administration, and an additional 1 week of law enforcement patrol during various hunting seasons. Refuge law enforcement officers, Service special agents, and Missouri Conservation Officers enforce state and Refuge hunting regulations.

Anticipated Impacts of the Use: The unique wildlife associated with this Refuge is subterranean. Direct access to the cave entrance and exit and the subterranean habitat is restricted. Only access above ground will occur at the Turnback Creek parcel. This will prevent direct contact with the unique subterranean habitat and associated species. Accommodating this wildlife-dependant use is expected to result in minimal impacts. Although hunting causes mortality to wildlife, season dates and bag limits are set with the long-term health of populations in mind. Populations of certain species, for example white-tailed deer, are monitored by the Missouri Department of Conservation. A regulated harvest will not adversely affect the State deer population level. Without harvest, deer quickly overpopulate an area causing degradation to the quality and quantity of vegetation. Therefore, deer hunting promotes a healthier, more robust, and diverse plant community. Disturbance to wildlife may also result from hunting activity. This disturbance is expected to be limited in scope and duration. All motor vehicle use is prohibited which reduces disturbance to wildlife.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are required to ensure compatibility:

1. This use is subject to modification if on-site monitoring by Refuge personnel or other autho-

alized personnel results in unanticipated negative impacts to natural communities, wildlife species, or their habitats.

2. This use must be conducted in accordance with State and Federal regulations, and special

Refuge regulations published in the Refuge Hunting Regulations and Public Use Regulations brochures.

Justification: In view of the above and with the stipulations previously described, hunting will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Hunting seasons and bag limits are established by the Missouri Department of Conservation and generally adopted by the Refuge. These restrictions ensure the continued well-being of overall populations of game animals. Hunting does result in the taking of many individuals within the overall population, but restrictions are designed to safeguard an adequate breeding population from year to year. Specific Refuge regulations address equity and quality of opportunity for hunters, and help safeguard Refuge habitat. Disturbance to other fish and wildlife does occur, but this disturbance is generally short-term and adequate habitat occurs in adjacent areas. Loss of plants from boat or foot traffic is minor, or temporary, since hunting occurs mainly after the growing season. Conflicts between hunters are localized and are addressed through law enforcement, public education, and continuous review and updating to state and Refuge hunting regulations. Conflicts between other various user groups are minor given the season of the year for hunting. The stipulations above will ensure proper control of the means of use and provide management flexibility should detrimental impacts develop. Allowing this use also furthers the mission of the National Wildlife Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the Refuge.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Research by Third Party

Refuge Name: Ozark Cavefish National Wildlife Refuge

Establishing and Acquisition Authority(ies): The Endangered Species Act of 1973 (16 U.S.C. 1534(a)(2)).

Purpose(s): to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants. The particular purposes of establishing the Refuge were to:

*insure the biological integrity of Turnback Creek Cave Springs ecosystem that provides essential habitat for the threatened Ozark Cavefish, the endangered Gray Bat, and other cave-adapted amphipods, isopods, cave snails, pseudoscorpions, millipedes, and other cave organisms.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Long-term water quality monitoring occurs at the 1-acre Hearrell Springs portion of the Refuge in Neosho, Missouri. No known research is currently being conducted at the Turnback Creek portion of Ozark Cavefish NWR. The Draft Comprehensive Conservation Management Plan (DCCP) identifies several potential research activities that would potentially involve third party assistance. Studies could be conducted by Federal, State, and private entities, including the U.S. Geological Survey, Missouri Department of Conservation, state and private universities such as the Gaylord Lab of University of Missouri, and independent researchers and contractors. The Mingo NWR which administers the Ozark Cavefish NWR will issue Special Use Permits (SUP) for biological and physical research studies. Some proposed studies have included mapping the recharge area for both parcels, water quality monitoring, cavefish monitoring, and monitoring/inventorying other species of interest including the bristle crayfish. All research must be in support of the Recovery Plan.

Availability of Resources: The Refuge will utilize existing staff to issue Special Use Permits for research projects that occur on the Ozark Cavefish NWR. Currently, staff resources are deemed adequate to manage this use at anticipated use levels. Review of the use, drafting and issuing the SUP, and compliance assessments will utilize on average 3 hours of staff time per permit.

Anticipated Impacts of the Use: Research activities may disturb fish and wildlife and their habitats. For example, the presence of researchers can cause birds to flush from resting and feeding areas, cause disruption of birds and turtles on nests or breeding territories, or increase predation on nests and individual animals as predators follow human scent or trails. Efforts to capture animals can cause disturbance, injury, or death to groups of wildlife or to individuals. To wildlife, the energy cost of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expended to avoid disturbance. Sampling activities can cause compaction of soils and the trampling of vegetation, the establishment of temporary foot trails and boat trails through vegetation beds, disruption of bottom sediments, and minor tree damage when temporary observation platforms are built or marking locations. Installation of posts, equipment platforms, collection devices, and other research equipment may present a hazard if said items are not adequately marked and/or removed at appropriate times or upon completion of the project. Research efforts may also discover methods that result in a reduction in impacts described above.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are necessary to ensure compatibility:

1. Prior to conducting investigations, researchers will obtain a Special Use Permit from Mingo

NWR that contains specific stipulations related to when, where, and how the research will be conducted. The Refuge Manager retains the option to prohibit research on the Refuge which does not contribute to the purposes of the Refuge or the mission of the Refuge System, or causes undue resource disturbance or harm.

2. Researchers must possess all applicable State and Federal permits for the capture and possession of protected species, for conducting regulated activities in wetlands, and for other regulated activities.
3. Researchers will submit findings, such as annual status reports or a final report, in a timely manner to the Refuge Manager for inclusion in the decision-making and management process.
4. Researchers must clearly mark posts, equipment platforms, fencing material, and other equipment left unattended to reduce the hazard. Such items shall be removed promptly upon completion of the research.
5. Research contributing to the needs of the Recovery Plan is a priority.
6. As appropriate, Refuge staff will assist and be engaged in research activities to verify safety of the cavefish and contribute assistance to the effort.

Justification: In view of the above and with the stipulations previously described, research activities will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Research by third parties plays an integral role in Refuge management by providing information needed to manage the Refuge on a sound scientific basis. Investigations into the biological components of the Refuge provide a means to analyze management actions, impacts from internal and outside forces, and ongoing natural processes on the Refuge environment. Research provides scientific evidence as to whether the Refuge is functioning as intended and meeting the goals and objectives of the Recovery Plan.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Environmental Education, Wildlife Observation, Photography, and Interpretation

Refuge Name: Pilot Knob National Wildlife Refuge

Establishing and Acquisition Authority(ies): The Endangered Species Act of 1973 (16 U.S.C. 1534(a)(2)).

Purpose(s): to conserve (A) fish or wildlife which are listed as endangered species or threatened species. The particular purposes of establishing the Refuge were to:

secure the land where mine entrances were located to prevent unauthorized use of the area and eliminate human disturbance of hibernating bats.

prevent the loss of bat habitat.

help maintain and increase the existing bat population with the goal of eventually delisting the Indiana bat.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: Environmental education, wildlife observation, photography, and interpretation exist as very restricted access that is highly supervised. In FY 2004, a total of 50 individuals participated in this activity. The use is supervised by Refuge staff, is of short duration, and occurs during daylight hours only. The programming includes the unique geologic formations of the iron-ore mountain and the natural history and management of the Indiana Bat. Access is restricted to walking only. At any given event, groups containing less than 20 individuals occur. Due to the dangers of the area and sensitivity of the bats, use is restricted to outside the hibernation period, and access to the cave entrance and other sensitive areas is denied. Refuge staff are present to monitor use and ensure stipulations are followed. This is a highly regulated and monitored use with the bats’ well-being as the first priority. Following the acquisition of a legal access accommodating 4-wheel drive vehicles and installation of fencing to restrict access to hazardous areas

and the cave entrances, additional guided public access will be available up to 100 individuals.

Availability of Resources: To conduct this use including: processing requests, attending events, and monitoring the use requires 10 days of staff time. The level of oversight is significant, but necessary. Pilot Knob Mountain contains unique geology found no where else in the world and is truly significant and rare. Field trips for the Indiana University, University of Arkansas, and University of Missouri at Columbia geology students occur annually conducted by Professor Cheryl Seeger of the Missouri Geological Survey in cooperation with the Refuge. In addition, Refuge Park Rangers, in cooperation with the Fort Davidson State Historic Site, host 3-hour hike/interpretive and educational treks from the base of the Pilot Knob Mountain to the top. These events occur concurrently with the Fort Davidson Civil War Reenactment or as an independent excursion. Following an acquisition of an access easement, Refuge staff will evaluate and potentially erect an overlook to aid in environmental education, interpretation, wildlife observation, and photographic opportunities.

Anticipated Impacts of the Use: Disturbance of wildlife is the primary concern regarding these uses. Disturbance to wildlife is inherent to these activities. There is some temporary disturbance to wildlife due to human activities on trails; however, the disturbance is generally localized and will not adversely impact overall populations. There is short term disturbance caused from trampling along the access trail and other portions of the Refuge during the interpretive portions of the trek and educational programming; however, the rocky substrate minimizes the effects. Great care is necessary to ensure the safety of the Indiana Bat. There is no acceptable amount of disturbance to hibernating bats. As described and implemented, there is no perceived disturbance to the bats. The use is restricted to daylight hours when the bats are in the cave or in maternal colonies during summer and spring along rivers and streams. Access to the cave entrances and hazardous areas is prohibited.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

_____ Use is Not Compatible

 X Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: For this use to be compatible the following stipulations are necessary:

1. An individually evaluated and issued Special Use Permit is required for each event.
2. Hazardous areas and cave entrances are restricted from access.
3. All use will occur during day light hours and outside the critical hibernating period.
4. Refuge staff will monitor bat response and if disturbance is noted, the use will be eliminated.

Justification: In view of the above and with the stipulations previously described, environmental education, wildlife observation, photography, and interpretation will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. There is a great interest in the scenic beauty of Pilot Knob Mountain by local residents, and those interested in geology due to the Mountain's unique deposits. The area was once open to the general public when it was privately owned by the Pilot Knob Ore Company. People frequently visited the area to enjoy the vista and study rock formations. When the area was donated to the U.S. Fish & Wildlife Service for the protection of the Indiana bat in 1987, a fence was erected within the 90-acre tract and access to the public was denied. The community was not informed about these changes nor was the justification for this closure shared. This has created much animosity

against the Refuge and the bats. Highly regulated public use can foster an appreciation and understanding and help develop grass-roots support for the Refuge and Indiana bats without hindering the bats. Through our efforts of interpretation and education, we can break down the animosity, develop support for the Refuge, and modify the community's perspective of the bats. We can explain bat's ecological role and the mine's uniqueness and critical role it plays in the health and existence of the species.

Signature: Refuge Manager: _____

(Signature and Date)

Concurrence: Regional Chief: _____

(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

COMPATIBILITY DETERMINATION

Use: Research by Third Party

Refuge Name: Pilot Knob National Wildlife Refuge

Establishing and Acquisition Authority(ies): The Endangered Species Act of 1973 (16 U.S.C. 1534(a)(2)).

Purpose(s): to conserve (A) fish or wildlife which are listed as endangered species or threatened species. The particular purposes of establishing the Refuge were to:

secure the land where mine entrances were located to prevent unauthorized use of the area and eliminate human disturbance of hibernating bats.

prevent the loss of bat habitat.

help maintain and increase the existing bat population with the goal of eventually delisting the Indiana bat.

National Wildlife Refuge System Mission: “The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Description of Use: In FY 2004, two research projects were conducted at Pilot Knob Refuge. All were conducted by Missouri Department of Conservation and implemented by Missouri’s Bat Biologist, Richard Clawson. Research included population estimates from capture results. At that time, 858 bats were captured and 847 identified to species. It is estimated that the health of the population is good and stable with approximately 250,000 individuals. These population estimates occur annually and Refuge staff assist with the research. In addition to this research, a researcher from the University of Missouri at Columbia conducted bat detection research with Anabat technology. Development of this detection technique could limit or eliminate the need to capture bats to assess populations and/or presence in surveyed caves. All research requires a Special Use Permit and techniques and methodology are reviewed and authorized in a case-by-case manner. Access is restricted to walking access only, until a legal access capable of allowing 4-wheel drive vehicles can be obtained. All research must be in support of the Recovery Plan.

cles can be obtained. All research must be in support of the Recovery Plan.

Availability of Resources: To conduct this use including: processing requests, attending events, and monitoring the use requires 3 days of staff time. The level of oversight is significant, but necessary. The Refuge staff will continue to strive to obtain a legal access that is capable of accommodating 4-wheel drive vehicles. When that occurs, limited vehicular access will be authorized.

Anticipated Impacts of the Use: During research, individual bats are/may be subjected to handling which can cause an increase in stress. No deaths to the bats have been reported from this activity. The data gathered on the population are necessary for implementation of the Recovery Plan and monitoring the usage of the area by the bats.

Public Review and Comment: This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for Mingo, Pilot Knob, and Ozark Cavefish National Wildlife Refuges, which was announced in the Federal Register and available for public comment for 30 days.

Determination:

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations are necessary to ensure compatibility:

1. Research contributing to the needs of the Recovery Plan is a priority.
2. Researchers must possess all applicable State and Federal permits for the capture and possession of protected species.
3. Research requires a Special Use Permit that will be evaluated prior to conducting the research.
4. As appropriate, Refuge staff will assist and be engaged in research activities to verify safety of the bats and contribute assistance to the effort.
5. Researchers will submit findings, such as annual status reports or a final report, in a timely manner to the Refuge Manager for inclusion in the decision-making and management process.

Justification: In view of the above and with the stipulations previously described, research activities will not materially interfere with or detract from the purposes of the Refuge or the mission of the Refuge System. Research by third parties plays an integral role in Refuge management by providing information needed to manage the Refuge on a sound scientific basis. Investigations into the biological components of the Refuge provide a means to analyze management actions, impacts from internal and outside forces, and ongoing natural processes on the Refuge environment. Research provides scientific evidence as to whether the Refuge is functioning as intended and meeting the goals and objectives of the Recovery Plan.

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date:

